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PATENT

# Best Available Copy

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants(s): Thomas Pratt, et al.

Patent No.: 6,712,907

Issue Date: March 30, 2004

Serial No.: 09/887,202

Filing Date: June 21, 2001

Title: Magnetically Coupled Linear Servo-Drive Mechanism

Atty. Docket No.: 10001.001100 (NVLS 432)

Attn: Certificate of Correction Branch  
Commissioner For Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Certificate  
APR 28 2004  
of Correction

## REQUEST FOR CERTIFICATE OF CORRECTION

Sir:

The Following errors, as more fully described below, appear in this patent.

The Applicant submits that no fee is due for correction of the errors made by the Patent and Trademark Office; OR,

The errors occurred in good faith. Correction thereof does not involve such changes in the patent as would constitute new matter or would require re-examination. A Certificate of Correction is requested. Enclosed herewith is payment in the amount of \$\_\_\_\_ to cover the fee for this Certificate of Correction.

Attached hereto are duplicate Forms PTO/SB/44, with at least one copy that is suitable for printing.

APR 28 2004

Applicant kindly requests the following changes:

Claim 1 should read:

A semiconductor wafer processing system, comprising:  
a reactor for processing at least one semiconductor wafer;  
at least one load lock coupled to the reactor; and  
a magnetically coupled linear servo-drive mechanism located within the at least one load lock to transfer wafers to and from the reactor, the servo-drive mechanism comprising:  
a carriage for holding a wafer;  
a driven magnet array within the carriage;  
a guiding mechanism for guiding the carriage linearly;  
a cylindrical tube housing a linear actuator and isolating the actuator from a wafer environment in the load lock, a driving magnet array inside the cylindrical tube and mounted to an output of the linear actuator, the driving magnet array magnetically coupled to the driven magnet array mounted within the carriage;  
an engine coupled to the actuator to drive the actuator; and  
a controller coupled to the engine to control the engine for optimizing transfer times and controlling acceleration; and  
wherein the driven magnet array forms a magnetic rotation lock with the driving magnet array.

Claim 10 should read:

A magnetically coupled linear servo-drive mechanism for use in a load lock of a semiconductor fabrication system, comprising:  
a carriage having a first magnet array;  
a guiding mechanism for guiding the carriage linearly;  
a cylinder housing an actuator, the actuator magnetically coupled to the carriage using a second magnet array;  
an engine coupled to the actuator to drive the actuator; and  
a controller coupled to the engine to control the engine for optimizing transfer times and controlling acceleration; and  
wherein the first magnet array forms a magnetic rotation lock with the second magnet array.

Claim 19 should read:

A method for linearly translating a wafer in a semiconductor wafer fabrication system, comprising:

placing a wafer on a carriage, the carriage having a first magnet array;  
magnetically coupling an actuator to the carriage using a second magnet array to allow propulsion of the carriage, the actuator isolated from a vacuum environment;

forming a magnetic rotation lock between the first magnet array and the second magnet array; and translating the actuator linearly.

The requested corrections are based on the Response to Final Office Action filed on September 10, 2003, a copy of which is enclosed and marked as Exhibit A.

Please send the Certificate to:

Patrick Benedicto  
Okamoto & Benedicto LLP  
P.O. Box 641330  
San Jose, CA 95164-1330

Respectfully submitted,  
Pratt, et al.

Dated: April 22, 2004

By:

*Patrick Benedicto*

Patrick D. Benedicto, Reg No. 40,909  
Attorney For Applicant(s)  
OKAMOTO & BENEDICTO LLP  
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Enclosure(s)

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Signature:	<i>Patrick Benedicto</i>		
Typed or Printed Name:	Patrick D. Benedicto	Dated:	April 22, 2004
Express Mail Mailing Number (optional):			



# TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

		Application Number	09/887,202
		Filing Date	June 21, 2002
		First Named Inventor	Thomas M. Pratt
		Art Unit	1763
		Examiner Name	Moore, Karla A
Total Number of Pages in This Submission	12	Attorney Docket Number	10001.001100 (NVLS 432)

## ENCLOSURES (check all that apply)

<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment / Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/ Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> After Allowance Communication to Group <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): <b>Request for Certificate of Correction; PTO Form SB-44 (in duplicate); Copy of Response to Office Action filed on Sept. 10, 2003; Return receipt postcard</b>
Remarks		

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Patrick D. Benedicto, Reg No. 40,909 OKAMOTO & BENEDICTO LLP
Signature	
Date	April 22, 2004

## CERTIFICATE OF TRANSMISSION/MAILING

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Typed or printed name	Patrick D. Benedicto
Signature	
Date	April 22, 2004

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APR 28 2004

## UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO : US 6,712,907

DATED : Mar. 30, 2004

INVENTOR(S) : Pratt, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

on column 7, line 42, after "acceleration", insert

– ; and wherein the driven magnet array forms a magnetic rotation lock with the driving magnet array –

on column 8, line 13, after "acceleration", insert

– ; and wherein the first magnet array forms a magnetic rotation lock with the second magnet array –

on column 8, lines 43-50, claim 19 should read,

– A method for linearly translating a wafer in a semiconductor wafer fabrication system, comprising:

placing a wafer on a carriage, the carriage having a first magnet array;  
magnetically coupling an actuator to the carriage using a second magnet array to allow propulsion of the carriage, the actuator isolated from a vacuum environment;  
forming a magnetic rotation lock between the first magnet array and the second magnet array; and  
translating the actuator linearly. –

MAILING ADDRESS OF SENDER: Okamoto & Benedicto  
P.O. Box 641330  
San Jose, CA 95164-1330

PATENT NO. 6,712,907

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APR 28 2004

**UNITED STATES PATENT AND TRADEMARK OFFICE**  
**CERTIFICATE OF CORRECTION**

PATENT NO : US 6,712,907

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It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

on column 7, line 42, after "acceleration", insert

– ; and wherein the driven magnet array forms a magnetic rotation lock with the driving magnet array –

on column 8, line 13, after "acceleration", insert

– ; and wherein the first magnet array forms a magnetic rotation lock with the second magnet array –

on column 8, lines 43-50, claim 19 should read,

– A method for linearly translating a wafer in a semiconductor wafer fabrication system, comprising:

placing a wafer on a carriage, the carriage having a first magnet array;  
magnetically coupling an actuator to the carriage using a second magnet array to allow propulsion of the carriage, the actuator isolated from a vacuum environment;  
forming a magnetic rotation lock between the first magnet array and the second magnet array; and

translating the actuator linearly. –

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San Jose, CA 95164-1330

PATENT NO. 6,712,907

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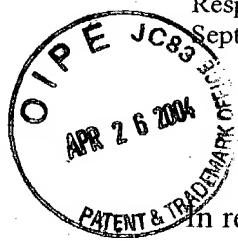
This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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APR 28 2004

Exhibit A

Docket No. 10001.001100 (NVLS 432)  
Response To Office Action  
September 10, 2003



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Thomas M. Pratt et al.

Serial No. 09/887,202

Examiner: Moore, Karla A

Filing Date: June 21, 2001

Art Unit: 1763

Title: Magnetically Coupled Linear Servo-Drive Mechanism

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Honorable Commissioner of Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

RESPONSE TO FINAL OFFICE ACTION

INTRODUCTORY COMMENTS

Sir:

This paper is responsive to the office action mailed on July 16, 2003 (hereinafter the "last office action").

Please amend the above-identified application as follows:

AMENDMENTS TO THE CLAIMS

Claim 1 (currently amended): A semiconductor wafer processing system, comprising:  
a reactor for processing at least one semiconductor wafer;  
at least one load lock coupled to the reactor; and  
a magnetically coupled linear servo-drive mechanism located within the at least one load lock to transfer wafers to and from the reactor, the servo-drive mechanism comprising:  
a carriage for holding a wafer;  
a driven magnet array within the carriage;  
a guiding mechanism for guiding the carriage linearly;  
a cylindrical tube housing a linear actuator and isolating the actuator from a wafer environment in the load lock, a driving magnet array inside the cylindrical tube and mounted to an output of the linear actuator, the driving magnet array magnetically coupled to the driven magnet array mounted within the carriage;  
an engine coupled to the actuator to drive the actuator; and  
a controller coupled to the engine to control the engine for optimizing transfer times and controlling acceleration; and  
wherein the driven magnet array forms a magnetic rotation lock with the driving magnet array.

Claim 2 (original): The system of claim 1, wherein the reactor uses chemical vapor deposition.

Claim 3 (previously amended): The system of claim 1, wherein the driven magnet array includes permanent magnets that are radially aligned within the carriage and have alternating polarities.

Claim 4 (previously amended): The system of claim 3, wherein the actuator comprises:  
a shaft coupled to a pulley system, the pulley system coupled to the engine; and  
a nut coupled to the driving magnet array, the driving magnet array including permanent magnets arranged radially and having alternating polarities, the nut being coupled to the shaft such that the nut moves axially along the length of the shaft when the shaft rotates.

Claim 5 (previously amended): The system of claim 4, wherein the driven magnet array includes at least two magnets having opposite polarities.

Claim 6 (previously amended): The system of claim 5, wherein the driving magnet array has the same number of magnets as the driven magnet array.

Claim 7 (original): The system of claim 1, wherein the guiding mechanism includes a linear ball slide.

Claim 8 (previously amended): The system of claim 1, wherein the cylindrical tube is non-magnetic.

Claim 9 (previously amended): The system of claim 4, wherein the shaft is a ball screw shaft.

Claim 10 (currently amended): A magnetically coupled linear servo-drive mechanism for use in a load lock of a semiconductor fabrication system, comprising:

- a carriage having a first magnet array;
- a guiding mechanism for guiding the carriage linearly;
- a cylinder housing an actuator, the actuator magnetically coupled to the carriage using a second magnet array;
- an engine coupled to the actuator to drive the actuator; and
- a controller coupled to the engine to control the engine for optimizing transfer times and controlling acceleration; and

wherein the first magnet array forms a magnetic rotation lock with the second magnet array.

Claim 11 (cancelled)

Claim 12 (previously amended): The magnetically coupled linear servo-drive mechanism of claim 10, wherein the first magnet array includes permanent magnets that are radially aligned within the carriage and have alternating polarities.

Claim 13 (previously amended): The magnetically coupled linear servo-drive mechanism of claim 12, wherein the actuator comprises:

- a shaft coupled to a pulley system, the pulley system coupled to the engine;
- a nut coupled to the second magnet array, the second magnet array includes permanent magnets arranged radially and having alternating polarities, the nut coupled to the shaft such that the nut moves axially along the length of the shaft when the shaft rotates.

Claim 14 (original): The magnetically coupled linear servo-drive mechanism of claim 13, wherein the first magnet array includes at least two magnets having opposite polarities.

Claim 15 (original): The magnetically coupled linear servo-drive mechanism of claim 14, wherein the second magnet array has the same number of magnets as the first magnet array.

Claim 16 (original): The magnetically coupled linear servo-drive mechanism of claim 10, wherein the guiding mechanism includes two guide shafts.

Claim 17 (original): The magnetically coupled linear servo-drive mechanism of claim 10, wherein the cylinder is non-magnetic.

Claim 18 (previously amended): The magnetically coupled linear servo-drive mechanism of claim 13, wherein the shaft is a ball screw shaft.

Claim 19 (original): The magnetically coupled linear servo-drive mechanism of claim 13, further comprising a four-axis gimbal between the nut and the second magnet array.

Claim 20 (currently amended): A method for linearly translating a wafer in a semiconductor wafer fabrication system, comprising:

placing a wafer on a carriage, the carriage having a first magnet array;  
magnetically coupling an actuator to the carriage using a second magnet array to allow propulsion of the carriage and to form a rotation lock, the actuator isolated from a vacuum environment; and  
forming a magnetic rotation lock between the first magnet array and the second magnet array; and  
translating the actuator linearly.

Claim 21 (original): The method of claim 20, wherein the translating includes optimized motion.

Claim 22 (previously amended): A device for linearly translating a wafer in a semiconductor wafer fabrication system, comprising:

means for placing a wafer on a carriage, the carriage having a first magnet array;  
means for magnetically coupling an actuator to the carriage, the actuator isolated from a vacuum environment, the actuator having a second magnet array rotationally locked with the first magnet array; and  
means for translating the actuator linearly.

REMARKS

With the above amendments, claims 1-10, and 12-22 remain in the application. Claim 11 has been cancelled.

In the last Office Action, claims 11 and 19 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 22 was also allowed. The Applicants thank the Examiner for deeming claims 11 and 19 allowable, and for allowing claim 22.

Independent claims 1, 10, and 20 have been amended to recite features of then claim 11. Claim 11 has been cancelled. Therefore, it is respectfully submitted that claims 1, 10, and 20 are now in condition for allowance. Dependent claims 2-9 ultimately depend on claim 1, dependent claims 12-19 ultimately depend on claim 10, and dependent claim 21 ultimately depend on claim 20. It is respectfully submitted that the aforementioned dependent claims are patentable at least for the same reasons that the claims they depend on are patentable.

For at least the foregoing reasons, it is respectfully submitted that claims 1-10, and 12-22 are now in condition for allowance. If the next communication is other than a Notice Of Allowance, the Examiner is invited to telephone the undersigned at (408)436-2112.

If for any reason an insufficient fee has been paid, the Commissioner is hereby authorized to charge the insufficiency to Deposit Account No. 50-2427.

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Docket No. 10001.001100 (NVLS 432)  
Response To Office Action  
September 10, 2003

Respectfully yours,  
Thomas M. Pratt et al.

Dated: September 10, 2003

*Patrick Benedicto*

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Signature:	<i>Patrick Benedicto</i>		
Typed or Printed Name:	Patrick D. Benedicto	Dated:	September 10, 2003
Express Mail Mailing Number (optional):			